
BUSINESS INFORMATICS AND MATHEMATICAL MODELING IN THE DIGITAL ECONOMY

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ASSESSING THE EFFECT OF E-GOVERNMENT INITIATIVES ON BUSINESS ACTIVITIES

Abstract:

Quality public service delivery in today's modern era of businesses springing up all around the globe is essential to business development and success. Governments are realizing the benefit of implementing e-Government initiatives in order to reduce administrative burden on corporations as well as SMEs and entrepreneurs. By providing e-registration, e-procurement and e-taxation portals for firms to carry out their various business processes.

This study by adopting univariate simple correlation, granger-causality and Bayesian networks analyzes the top three and bottom three performing countries from the United Nations' e-Government 2016 survey and their respective World Bank Doing Business 2016 indicators, i.e. Starting a Business and Paying Taxes, to assess the relationship. Thus proving that e-Government implementations are pertinent to successful business processes precisely starting a business and paying of taxes.

Keywords:

e-Government, Doing Business, Public Sector Innovation, Impact Assessment.

Introduction

The value of integrating Information Communication Technology (ICT) in government and public services in this modern digital era is evident across the world, especially in developed economies. E-Government is defined by Fountain [1] as the production and delivery of information and services inside government and between government as well as the public using a range of information and communication technologies. Thus utilizing ICT in offering quality public services to its citizens with the goal of improving their livelihood.

Based on the proposed benefits by numerous researchers that e-government implementation is a potential for reducing administrative cost burden in government. From starting one's business to paying of taxes, e-government is capable of reducing bureaucratic process in public services as a result of the measures which are put in place by the system [2][3][4][5].

For the purpose of this study, the context of business and business activities is with respect to starting a business and paying taxes. The rest of this paper is structured as follows. In section two, e-government and the e-Government Development Index (EGDI), the Doing Business indicators pertinent to this study (Starting a Business and Paying Taxes) are reviewed. Section three discusses the data and methodology used in ascertaining the proposition. In section four, entails the discussion of results and findings of the analysis and section five concludes and discusses key contributions of this study to e-government impact assessment literature.

Literature Review

e-Government Development Index

The purpose of e-government calls for rethinking ways the government functions are carried out today in order to improve processes and integration aside the conversion of traditional information into bits and bytes (digitizing) and making it reachable via the internet websites or giving government officials computers or automating old practices to an electronic platform [2]. In their bid to integrate ICT into the public sector so as to offer quality service delivery, governments take into consideration the deficiencies in the system and formulate the necessary framework (i.e. policies, development and execution plans) to yield maximum utility. As

outlined by Hanna [6] and Berntzen [4], e-government improves investment climate and competitiveness; improves governance, transparency and accountability; improves efficiency and resource management; improves access and quality of public services; provides more inclusive public services; increases users' value and satisfaction; improves policy making and enhances citizen participation. EGDI ranges between 0 and 1.

The United Nation since 2005 till date set out on the path of measuring the efficiency with which governments across the world continue to assess e-government development at the national level and is a composite index based on the weighted average of three normalized indices; One-third is derived from a Telecommunications Infrastructure Index (TII) based on data provided by the International Telecommunications Union (ITU), one third from a Human Capital Index (HCI) based on data provided by the United Nations Educational, Scientific and Cultural Organization (UNESCO), and one third from the Online Service Index (OSI) based on data collected from an independent survey questionnaire that assesses the national online presence of all 193 United Nations Member States [5]. The EGDI is beneficial in;

- Measuring the readiness and capacity of national administrations to use ICT to deliver public services;
- Gaining a deeper understanding of the relative position of a country in utilizing e-government for the delivery of public services.

Starting a Business and Paying Taxes

As stated by the UNDESA [5] report, “regarding sectorial and transactional services, more countries have introduced online services for tax submission and registration of businesses, thus reducing the administrative burden for new and existing businesses and increasing transparency”. The need for public sector reform is evident in the increasing endeavour with respect to digital literacy and bridging the digital divide, the proliferation of social media and ubiquitous computing, as well as a vast adoption of electronic commerce in today's world. In order to streamline and simplify the business registration and tax compliance processes, governments, within the past decade began to introduce comprehensive tax and business registration reforms.

The Impact of e-Government on Business

A study by Choi et al. [7] on e-government in assessing government capacity concluded that the role of e-government proved more crucial for human development than the role of policies and institutions and as such e-government plays a vital role in supporting the citizen livelihood. To achieve this, successful countries such as Estonia turned to a more user-centric perspective where the citizen is the main focus of designing any public sector implementation. According to Almeida & Zouain [8], improvements in e-government and its indexes can explain the change of positions of a given country in Ease of Doing Business and in Total early-stage entrepreneurial activity which includes business registration activities and taxation. They also indicated that the human capital is the most effective way to improve a country's business atmosphere, without considering the country's income level. Thus, e-government plays a key role in improving upon human development which in turn creates a conducive environment for successful business activities.

Hence, submitting tax returns online from anywhere on-the-go, including historical data retrieval, e-government impacts businesses in the following ways;

Aside saving businesses time (since it has been reported that contributions which are paid in person involves delays), electronic filing also helps prevent human errors in tax returns. For example, Peru's online tax payment system is credited with significantly increasing the efficiency of tax administration because it identifies and automatically rejects incomplete returns, reducing the number of returns that require verification and correction [6].

By increasing transparency, electronic filing limits opportunities for corruption and bribery [5].

Provides business support services for SMEs and facilitate access to finance [6].

According to the World Bank Doing Business 2016 report, an in-depth look at a number of countries whose e-government implementations have positively influenced the business landscape and reduced bureaucratic constraints reveals that;

The introduction and improvement of online procedures in South Africa have eased barriers to start-up.

The creation of one-stop-shop services and their improvement for public services in Niger and Egypt.

Also, in the light of similar reforms with respect to tax compliance, the introduction and improvement of tax declaration and returns systems in Albania, Japan and Uruguay have simplified taxation processes.

Data and Methodology

Data

In order to achieve the desired goal, this study utilized secondary data comprising of the Paying Taxes and Starting a Business indicators from the World Bank's Doing Business 2016 Report. The 'Paying Taxes' indicator records the taxes and mandatory contributions that a medium-size company must pay or withhold in a given year, as well as measures the administrative burden in paying taxes and contributions [9]. While, the 'Starting a Business' measures the paid-in minimum capital requirement, number of procedures, time and cost for a small- to medium-sized limited liability company to start up and formally operate in economy's largest business city [9]. The distance to frontier (DTF) for both indicators is incorporated into the study and this score aids in assessing the absolute level of regulatory performance and how it improves over time. This measure shows the distance of each economy to the "frontier" which represents the best performance observed on each of the indicators across all economies in the Doing Business sample since 2005 [9].

For analysing e-Government development, the United Nations' 2016 E-Government Survey Report was made use of.

Methodology

The study utilizes the simple univariate linear regression model [10] to study the relationship between the dependent variables Y; Paying Taxes indicator (Y1) and Starting a Business indicator (Y2).

The independent variable X; the E-Government Development Index (EGDI) comprised of 30 observations which represent the top three and bottom three performing countries in the continents; Africa, Americas, Asia, Europe and Oceania but eventually Cuba was eliminated because the World Bank's doing business indicators were unavailable. Thus 29 observations in total. The lmtest and zoo R-packages were used in achieving the univariate simple linear regression and also in measuring the correlation between both Doing Business Indicators and EGDI. Table 1 below represents the collective data for the analysis purposes. The countries with the top three EGDI in each region are shaded.

To support the proposition of the research, a Bayesian Network [11] implemented in *bnlearn* R-package. Also, the Granger Causality test [12] was used in supporting the correlation results.

All analysis were performed with the R programming language using the R-Studio IDE.

Table 1 - Representation of Countries Grouped into Continents and their respective EGDI, Starting a Business indicator and Paying Tax indicator.

Continent	Country	EGDI	Starting a Business (DTF)	Paying Taxes (DTF)
Africa	Mauritius	0.6231	91.65	82.96
	Tunisia	0.5682	85.01	68.96
	South Africa	0.5546	80.47	81.09
	Guinea	0.1226	80.2	24.28
	Niger	0.0593	86.16	50.19
	Chad	0.1256	51.91	18.76
AMERICAS	United States of America (USA)	0.842	91.23	83.85
	Canada	0.8285	98.23	88.86
	Uruguay	0.7237	89.79	66.08
	Honduras	0.3611	77.02	54.97
	Guyana	0.3651	85.45	59.27

ASIA	Republic of Korea	0.8915	95.83	86.56
	Singapore	0.8828	96.49	91.85
	Japan	0.844	86.09	77.03
	Myanmar	0.2362	77.1	64.05
	Afghanistan	0.2313	92.08	51.29
	Yemen	0.2248	71.59	71.64
EUROPE	United Kingdom	0.9193	94.58	90.74
	Finland	0.8817	93.13	90.23
	Sweden	0.8704	94.64	85.28
	Romania	0.5611	89.48	81.64
	Albania	0.5331	91.73	70.96
	Bosnia and Herzegovina	0.5118	65.09	60.08
OCEANIA	Australia	0.9143	96.47	85.6
	New Zealand	0.8653	99.96	90.71
	Fiji	0.4989	73.13	67.55
	Vanuatu	0.3078	81.24	80.6
	Solomon Islands	0.2406	85.48	83.58
	Kiribati	0.3122	78.17	75.08

Results and Discussion

The result of this study contributes to the identification of relationship between e-Government and doing business, particularly starting a business and paying taxes. The hypotheses for the test are as follows:

H_1 :EGDI has an effect on Starting a Business (DTF)

H_2 :EGDI has an effect on Paying Taxes (DTF)

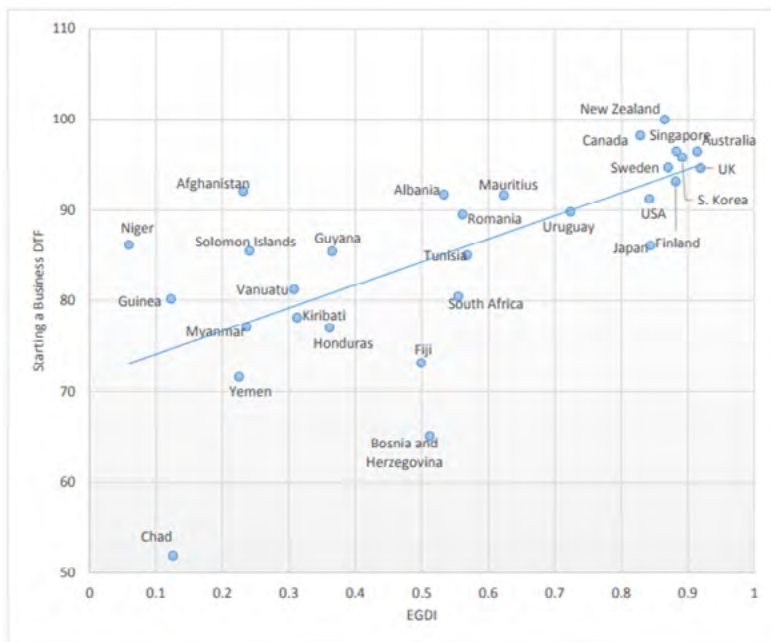


Figure 1. Scatter Distribution of Starting a Business (DTF) and EGDI for 2016

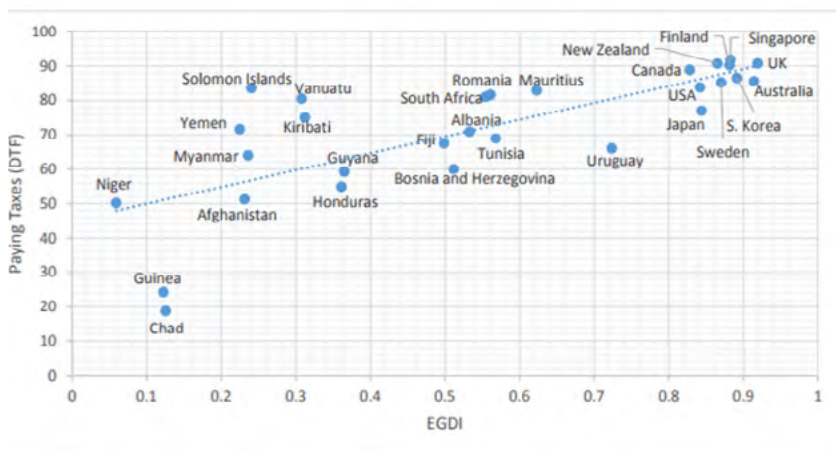


Figure 2 - Scatter Distribution of Paying Taxes (DTF) and EGDI for 2016

Figures 1 and 2 illustrates the graphically relationship between starting a business DTF and EGDI of the selected countries as well as paying taxes DTF respectively. It is evident that the topmost performers from the distribution are all developed economies as well as technologically advanced economies.

Granger Causality Test

Upon performing the for EGDI granger-causes 'Starting a Business (DTF)', the significant p-value of 0.004393 which rejects the null hypothesis that EGDI does not have an effect on the 'Starting a Business' (DTF) indicator which is a subset of Doing Business Index.

Likewise, the test for EGDI granger-causes 'Paying Taxes (DTF)', a significant p-value of 7.09e-05 rejects the null hypothesis that EGDI does not have an effect on the 'Paying Taxes' (DTF) indicator which is a subset of Doing Business Index.

Correlation Test

The first Pearson's correlation test revealed a strong positive linear relationship between Starting a Business and EGDI [(Starting a business ~ EGDI) = 0.6696966] with a significant p-value $< 2e-16$, indicating a strong correlation.

Similarly, the Pearson's correlation test for a relationship between Paying Taxes and EGDI [(Paying Taxes ~ EGDI) = 0.7511665] revealed a strong positive linear relationship as well as a significant p-value of 2.66e-06.

Hence, it is clearly evident in both cases that improvement in a country's public service delivery yields maximum benefit in both starting a business and paying of taxes.

Bayesian Network

Figure 3 is a Bayesian network which represents the causal chain and confirms the hypothesis H_1 that node EGDI causes node 'Starting a Business (DTF)'.

Figure 4 likewise represents a Bayesian network which is also a causal chain and confirms the hypothesis H_2 that node EGDI causes node 'Paying Taxes (DTF)'.

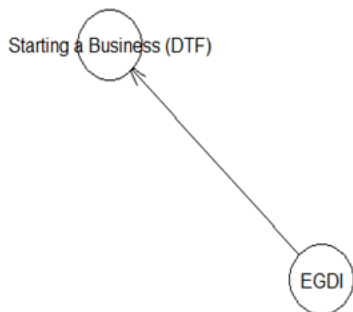


Figure 3 - Bayesian network of EGDI has an impact Starting a Business (DTF)

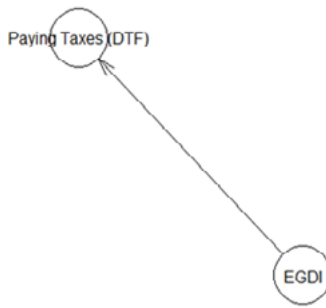


Figure 4 - Bayesian network of EGDI has an impact Paying Taxes (DTF)

The model represented by the graph in figure 3 assumes that the joint probability can be factored by: $P(\mathbf{EGDI}, \mathbf{Starting\ a\ Business\ (DTF)}) = P(\mathbf{EGDI}) P(\mathbf{Starting\ a\ Business\ (DTF)} | \mathbf{EGDI})$. For figure 4, the model represented assumes that the joint probability can be factored by; $P(\mathbf{EGDI}, \mathbf{Paying\ Taxes\ (DTF)}) = P(\mathbf{EGDI}) P(\mathbf{Paying\ Taxes\ (DTF)} | \mathbf{EGDI})$.

Thereby both networks are supporting proof to the propositions made in H_1 and H_2 .

Conclusion

In conclusion, the study aimed at establishing both correlation and causation. From the findings, it is evident that the adoption of quality citizen-centric e-government solutions is capable of boosting economic activity as a result of the ease with which business activities are carried out. Due to the fact that positive human development is a product of quality public service delivery which in turn eases administrative burden on SMEs and huge corporations. Hence, e-government leads to improved business processes at the public sector, i.e. Government-to-Business (G2B) and Business-to-Business (B2B).

Governments, especially developing economies need to adopt quality e-government in their bid to fight corruption and reduce bureaucracy not only in starting businesses and paying taxes, but every other public sector where citizens transact with. Eventually, e-Government positively impacts business process between citizens and their government.

REFERENCES

- Fountain, J.E., 2004. Digital government and public health. Preventing chronic disease, 1(4), pp. 1-5.
- Alshehri, M. and Drew, S., 2010. Implementation of e-government: advantages and challenges. In International Association for Scientific Knowledge (IASK).
- Agbozo, E., 2017. Developing a Digital Government Framework for Sub-Saharan Africa. In The Proceedings of 17th European Conference on Digital Government ECDG 2017 (p. 294).
- Berntzen, L., 2014, Measuring the Impact of eGovernment Services. In The Eighth International Conference on Digital Society, ICDS'14. IARIA.
- UNDESA, UN Department of Economic and Social Affairs. 2016. United Nations E-Government Survey 2016: E-Government in Support of Sustainable Development.
- Hanna, N.K., 2010. Uses of e-Government. In Transforming Government and Building the Information Society (pp. 93-116). Springer New York.
- Choi, H., Park, M.J. and Rho, J.J., 2017. Two-dimensional approach to governmental excellence for human development in developing countries: Combining policies and institutions with e-government. Government Information Quarterly.
- Almeida, G.D.O. and Zouain, D.M., 2016. E-government Impact on Business and Entrepreneurship in High-, Upper-middle-and Lower-income Countries from 2008 to 2014: A Linear Mixed Model Approach. Global Business Review, 17(4), pp.743-758.
- Business, D., 2016. Measuring regulatory Quality and Efficiency, World Bank Group Flagship Report 2016, 13th Edition, ISBN: 978-1-4648-0667-4, www.doingbusiness.org.
- Schneider, A., Hommel, G. and Blettner, M., 2010. Linear regression analysis: part 14 of a series on evaluation of scientific publications. Deutsches Ärzteblatt International, 107(44), p.776.
- Cowell, R.G., Dawid, P., Lauritzen, S.L. and Spiegelhalter, D.J., 2006. Probabilistic networks and expert systems: Exact computational methods for Bayesian networks. Springer Science & Business Media.
- Gao, W. and Ye, W.C.W., 2017. Directed information graphs for the Granger causality of multivariate time series. Physica A: Statistical Mechanics and its Applications.